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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/501,807	07/19/2004	Robert Graham Walker	BTW-082US	6615

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EXAMINER	
BLEVINS, JERRY M	

ART UNIT	PAPER NUMBER
2883	

DATE MAILED: 07/13/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/501,807	Applicant(s) WALKER ET AL.
	Examiner Jerry Martin Blevins	Art Unit 2883

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 July 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Specification

Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

In the present instance, the abstract contains more than the maximum allotted limit of 150 words.

Claim Objections

Claims 8 and 9 are objected to because of the following informalities:

The claimed “active regions” lack proper antecedent basis. For purposes of examination, “active regions” is interpreted to refer to conductive region of the waveguides.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1-12, and 14 are rejected under 35 U.S.C. 102(a) as being anticipated by Published UK Patent Application to Walker, number GB2361071A .

Regarding claim 1, Walker teaches a Mach-Zehnder interferometer modulator (Figure 1 and page 4, lines 10 and 11) for modulating a beam of laser light (page 1, line 20), the modulator comprising a pair of separate waveguides (Figure 1, elements 10 and 12) through which laser light is passed after splitting in a splitting zone (Figure 1, element 2) and after which the light is recombined in a merge zone (Figure 1, element 8), the waveguides being formed of a material having electro-optic properties (page 4, lines 14 and 15) and there being provided opposed pairs of electrodes (Figure 2, elements 40 and 42, where the dashed ovals represent the waveguides , and page 15, lines 10 ad 11) electrically located so as to be able to effect optical changes within the material of the waveguides (page 10, lines 10-13), wherein the waveguides are formed in a semiconductor material (page 7, lines 10 and 11) with one of the electrodes of each pair being formed in a doped layer (page 15, lines 13-15), said doped layer being of relatively high conductivity compared to the semiconductor material (page 15, line 14 teaches that the dopant is conductive) , buried within or below the waveguide material (Figure 2 and page 15, line 14) whilst the other electrode, a top electrode, is a surface metalisation (page 15, lines 21 and 22), the doped layer being trenched (trenches 46 and 48, page 15, line 16) so that adjacent electrodes in the doped layer are electrically isolated from one another so that one of the electrodes in the doped layer can be

connected with a different electrical polarity to the other electrode in the doped layer (page 10, lines 3 and 4) thereby permitting the connection of the pairs of electrodes in parallel anti-phase mode (page 6, lines 13 and 14).

Regarding claim 2, Walker teaches the limitations of the base claim 1. Walker also teaches a coplanar stripline transmission-line for an RF signal (page 8, lines 1 and 2) comprising a pair of metal rails (Figure 2, elements 40b and 42b) arranged on either side of the pair of waveguides, each rail effecting direct contact to the buried electrode (element 44) of the adjacent waveguide while also effecting contact to the top electrode (elements 40 and 42) of the remote waveguide by means of metal linkages (Figure 2, elements 40a and 42a) passing through or over the adjacent waveguide (page 15, line – page 16, line 2 and Figure 2).

Regarding claim 3, Walker teaches the limitations of the base claim 1. Walker also teaches a coplanar waveguide transmission-line for an RF signal (page 8, lines 1 and 2) having three rails, a central rail at one potential (ground) and located between the waveguides, and two outer rails at the same, second, potential which differs from the first potential (Figure 1 teaches two outer rails at potential Vmod and a central ground rail), with each waveguide of the pair of waveguides running in one of the two inter-rail gaps (Figure 1), the central rail effecting direct contact to the buried electrode of the first waveguide and contacting the top electrode of the second waveguide (Figure 1 and page 15, line – page 16, line 2) by means of metal linkages (Figure 5, elements 40a and 42a), the top electrode of the first waveguide being contacted by means of metal linkages (elements 40a and 42a) from the first outer rail, and the second outer rail

being in direct contact to the buried electrode of the second waveguide (Figure 1 and page 15, line – page 16, line 2).

Regarding claim 4, Walker teaches the limitations of the base claim 3. Walker also teaches that the doped layer (Figure 5, element 24) extends beneath the first outer rail (elements 40b and 42b), and there is provided a trench (elements 46 and 48) through the doped layer so as to isolate the region of the doped layer beneath the first waveguide from that beneath the first outer rail (Figure 5).

Regarding claim 5, Walker teaches the limitations of the base claim 1. Walker also teaches a coplanar stripline transmission-line for an RF signal (page 8, lines 1 and 2) having a pair of metal rails (Figure 2, elements 40b and 42b) arranged on either side of the pair of waveguides, each rail having a width sufficient to enable capacitive connection to the buried electrode over which it is located (page 11, lines 13-15) and effecting thereby high frequency contact to the buried electrode of the adjacent waveguide while also effecting contact to the top electrode of the remote waveguide by means of metal linkages (elements 40a and 42a) through or over the adjacent waveguide (page 10, line 16 – page 11, line 5).

Regarding claim 6, Walker teaches the limitations of the base claim 1. Walker also teaches a coplanar waveguide transmission-line for an RF signal (page 8, lines 1 and 2) comprising three rails, a central rail at one potential (ground) and located between the waveguides, and two outer rails at the same, second, potential (Figure 1 teaches two outer rails at potential Vmod and a central ground rail), with each waveguide of the pair of waveguides running in one of the two inter-rail gaps (Figure 1),

the central rail and one of the outer rails being of sufficient width to enable those rails to make capacitance contact with their opposed buried electrodes (page 11, lines 13-15), the central rail effecting capacitive contact to the buried electrode of the first waveguide and contacting the top electrode of the second waveguide (Figure 1 and page 15, line – page 16, line 2) by means of metal linkages (Figure 5, elements 40a and 42a), the top electrode of the first waveguide being contacted by means of metal linkages (elements 40a and 42a) from the first outer rail, and the second outer rail being in direct contact to the buried electrode of the second waveguide (Figure 1 and page 15, line – page 16, line 2), the capacitive contacts being effective electrical contacts for high frequency alternating signals (page 10, line 16 – page 11, line 5).

Regarding claim 7, Walker teaches the limitations of the base claim 6. Walker also teaches that the doped layer (Figure 5, element 24) extends beneath the first outer rail (elements 40b and 42b), and there is provided a trench (elements 46 and 48) through the doped layer so as to isolate the region of the doped layer beneath the first waveguide from that beneath the first outer rail (Figure 5).

Regarding claim 8, Walker teaches the limitations of the base claim 1. Walker also teaches a passive waveguide region (page 17, lines 14-18) trenched as in the active regions between the active regions and the merge zone (Figure 5).

Regarding claim 9, Walker teaches the limitations of the base claim 1. Walker also teaches a passive waveguide region (page 17, lines 14-18) trenched as in the active regions between the active regions and the splitter zone (Figure 5).

Regarding claim 10, Walker teaches the limitations of the base claim 1. Walker also teaches that the conductivity in the doped area (Figure 5, element 24) is locally removed in the region of the merge zone (by trenches 46 and 48).

Regarding claim 11, Walker teaches the limitations of the base claim 1. Walker also teaches that the conductivity in the doped area (Figure 5, element 24) is locally removed in the region of the splitter zone (by trenches 46 and 48).

Regarding claim 12, Walker teaches the limitations of the base claim 1. Walker also teaches that the semiconductor material is based on GaAs (page 11, line 19), and the waveguides are formed in GaAs (Figure 2, element 26) bounded by layers of AlGaAs (Figure 2, elements 24 and 28).

Regarding claim 14, Walker teaches the limitations of the base claim 1. Walker also teaches that the electrode formed by surface metalisation is a Schottky rectifying contact (page 16, line 8).

Claim Rejections - 35 USC § 103

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Walker in view of US Patent to Ishizaka, number 5,757,985.

Walker teaches the limitations of the base claim 1. Walker does not teach that the semiconductor material is selected from the group InGaAsP, GaInAsP, or GaAlInP or that the bounding layer is InP. Ishizaka teaches a semiconductor Mach-Zehnder modulator wherein the semiconductor waveguide material is an intrinsic InGaAsP and the bounding layer (clad layer) is InP (column 10, lines 59-65). It would have been obvious to one of ordinary skill in the art at the time of the invention to include the InGaAsP semiconductor and InP bounding layer of Ishizaka in the modulator of Walker. The motivation would have been to reduce loss and increase yield (Ishizaka column 3, line 67).

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Walker in view of US Patent to Shimizu, number 6,122,414.

Walker teaches the limitations of the base claim 1. Walker does not teach that the electrode formed by surface metalisation is in an ohmic contact to a p-doped under layer. Shimizu teaches a surface electrode (Figure 1B, elements 105-1 and 105-2) which is in ohmic contact to a p-doped under layer (element 104). It would have been obvious to one of ordinary skill in the art at the time of the invention to place the electrode of Walker in ohmic contact to a p-doped under layer, as taught by Shimizu. The motivation would have been to improve modulation efficiency by using changes in

the refractive index generated upon a reverse-bias voltage applied to a p-n junction (Shimizu, column 2, lines 1-3).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jerry Martin Blevins whose telephone number is 571-272-8581. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G. Font can be reached on 571-272-2415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JMB

Frank G. Font
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